PLAY METER

NEWS UPDATE

Volume 7, Number 8 May 1, 1981

JB list battle is lost

The AMOA's jukebox location list battle was lost in February when the U.S. Supreme Court refused to hear the case. In denying the AMOA appeal, the Supreme Court let stand a lower federal court ruling which upheld the Copyright Royalty Tribunal's authority to require operators to file lists of their jukebox locations in order to be in compliance with the law.

The battle, which saw the creation of a special AMOA legal defense fund, cost over $100,000. AMOA is continuing with the legal action fund, however, to challenge still another part of the unpopular law, that is, the increased per-box royalty rate set by the CRT.

But it has been the jukebox location list battle which many operators placed as the main fight. They argue that the location lists are confidential business information and that to give up these lists to a federal agency would jeopardize their businesses by leaving them open to future broadsides from so-called "blue sky" operstors who sell direct to locations.

The AMOA challenge centered on its contention over what constitutes "access" to the jukebox. The CRT—which, according to the law, must distribute the royalties collected by the performing rights societies—stipulated that the performing rights societies must have access to licensed jukebox locations so they can sample selections.

To the lost fight, the AMOA had no official reaction through its executive offices in Chicago. It was undecided whether or not the AMOA legal counsel would pursue a challenge of the CRT's constitutionality in passing its decisions.

The association has filed as a court intervenor in a challenge of the CRT decision in December to raise mechanical royalty rates on record sales to 4 cents per song. And in the appeal of the scale of per-jukebox rates, the AMOA counsel and attorneys for the CRT were due in federal court in Chicago on March 23, said Nick Allen, general counsel for the AMOA.

On the court confirmation of the requirement for operators to turn over location lists, AMOA Executive Vice President Leo Droste said the matter in February was "under advisement for possible course of action but there is nothing official at this time."

Allen said the Supreme Court's refusal to hear the location lists requirement appeal did not address the challenge of constitutionality of this requirement.

Meanwhile, operators were filing applications for jukebox royalty licenses at a rate "right in line with last year," according to the U.S. Copyright Office. Walter Sampson, chief of licensing, said at the end of February certifications had been issued for a total of 89,595 machines, which at the current $8 per-box rate had collected $716,762 in royalties.

During 1980, 136,000 jukebox licenses were issued, Sampson pointed out.

In the mechanical fees matter, under which the operator pays another royalty fee of 4¢ per song

continued on page 9

Nova Apparate changes hands

The Gauselmann-Automaten Group (West Germany) has acquired as of March 1, 1981 the internationally well-known import/export company Nova Apparate GmbH Co. KG. Hamburg.

Nova Apparate, one of the leading firms in the European coin machine trade, was solely owned up to this date by its founder, A.W. Adickes, who, due to his advanced age, decided to sell his company. The proceeds will be transferred to the Karla and Alfred W. Adickes Foundation, the means of which are used for charitable purposes.

Nova is one of the pioneers in the field of amusement machines. Already by in the early fifties, it imported the first amusement machines for the growing leisure industry in Germany and later also for many European companies. Nova is sole importer for Rock-Ola phonographs and vending machines

continued on page 10

Rock-Ola copy hit with action

FRANKFURT/MAIN — A West German court has found in favor of Rock-Ola Manufacturing Co. of Chicago with an injunction against an alleged copy of the Rock-Ola-licensed *Star Castle* video game.

Rock-Ola's attorneys had been able to convince the Frankfurt court on January 23 that Video Games Gmbh's *Space Castle* had infringed against *Star Castle*. Rock-Ola has licensed the game from Cinematronics, Inc., of El Cajon, California, which granted exclusive manufacturing and distributing rights in Europe.

The matter had arisen in London at the ATE show, where the German manufacturer was warned of potential action to be taken if the *Space Castle* game were shown in the IMA trade affair in Frankfurt. The game was removed from the British show without legal action.

Dr. David R. Rockola explained,

continued on page 9

NEWS UPDATE

Vol. 7, No. 8
May 1, 1981

Staff

Publisher and Editor:
Ralph C. Lally II
Editorial Director:
David Pierson
Managing Editor:
Ray E. Tilley
Administrative Assistant:
Valerie Cognevich
Art Director:
Katey Schwark
Circulation Manager:
Renee' C. Pierson
Technical Contributors:
Zac Oliver
Randy Fromm
Frank Seninsky
Correspondents:
Patrick Matthews
Roger C. Sharpe
Charles C. Ross
Dick Welu
Mary Claire Blakeman
Irving Blackman
Joseph Arkin
Tony Licata
Classified Advertising:
Valerie Cognevich
Advertising Manager:
David Pierson
European Representative:
Esmay Leslie

PLAY METER, May 1, 1981. Volume 7, No. 8. Copyright 1981 by Skybird Publishing Company. PLAY METER (ISSN 0162-1343) is published twice monthly on the 1st and 15th of the month. Publishing offices: 320 Old Hammond Highway, Metairie, La. 70005; **Mailing address**— P.O. Box 24170, New Orleans 70184. Tel. 504/838-8025. Subscription rates: U.S. and Canada—$25; Europe and Japan—$45; elsewhere—$50. Multiple-subscription orders: 2-9, $20 each; 10-24, $17 each; 25 or more, $15 each. Advertising rates available on request. No part of this magazine may be reproduced without expressed permission. The editors are not responsible for unsolicited manuscripts. Second-class postage paid at Springfield, Mass 01101 and additional mailing offices. **Postmaster**: Send Form 3579 to PLAY METER, P.O. Box 24170, New Orleans, La. 70184

European Office: PLAY METER Promotions, "Harescombe" Watford Road, Northwood Middx. England, Northwood 29244.

Pacific Novelty hits the water

After months of research and development and field testing, Pacific Novelty Manufacturing, Inc. has begun producing its first video game, *Shark Attack*.

Led by its president, Brian Semler, the Marina del Rey, California firm first showed the game at the 1980 AMOA show in Chicago.

"We called the prototype *Deep Death*," said Semler. "Reaction at the show was terrific. Because of the game's unusual playing perspective and its rather bizarre sound track, people were drawn to the booth, and later everybody wrote about it. We thought changing the name to *Shark Attack* would be a little more revealing—and the field testing results have indicated that the entire package is a winner." [*See the New Products pages of this NEWS UPDATE for more details of the video game.*]

For the job of seeing a company through its infancy, Semler has spent seven years preparing: he started as the European-American liaison for Segasa and Williams Electronics. Later, with his brother Larry Siegel (now the president of the Seeburn division of Stern Electronics), began a distributing and route operation in the San Francisco area. Four years later, he began developing video games and licensing them to various manufacturers.

According to Semler, manufacturing his own games was the "ultimate step of the progression." He said, "We have seven more games planned for this year All of them will be well-built, unique, and have the operator in mind. *Shark Attack* is a great start."

Among recent additions to Pacific's national distributor network are General Vending Sales Corp. of Baltimore and Circle International of Los Angeles.

U.S. Team Open cues up

MILWAUKEE—Ready to break during the weekend of April 4 and 5 will be the National Pocket Billiard Association's third annual "Schlitz Cup" U.S. Team Open Tournament, with a purse of $25,000 based on the number of expected entries.

Two innovations this year are the rule allowing players to enter the Schlitz Cup rounds twice, on two differently constituted and qualified teams from their league, and the guarantee that one win will put a team in the money with a minimum award of $200.

Of these changes, an N.P.B.A. spokesman explained: "We wanted to encourage teams in areas remote from Milwaukee, from even as far away as Southern California, Washington, and both coasts of Canada, to attend the tournament. By allowing each player to enter twice at a discounted fee," he continued, "yet limiting each team to a single entry, we're able to give these people additional opportunities to win at a reduced cost per player without exposing anyone to the experience of having to play the same team twice, or the same player more than twice."

Distant travelers to the tournament will also be given byes in the early rounds, the spokesman added.

The tournament will be held at Bayview Manor, 2535 South Kinnikinnic, Milwaukee.

Entry forms are available at local Schlitz distributors' displays—or call the National Pocket Billiard Association: 414/672-3935; write: 2635 West Burnham Street, Milwaukee 53204.

To qualify, all four players on a team must have competed regularly among one another on the same season schedule, and verfication of this is required in the form of league or team rosters, score sheets, or other evidence.

First team entry fee is $300; second team, $200 additional fee; third team, $100 additional; down to an added $50 for a fourth team. It is not necessary to send the fee with an entry; the league will be billed at a later time.

The 1980 event hosted 216 players and awarded over $10,000 plus trophies and patches. First place prize money alone was $5,250 awarded to the women's and men's Schlitz Cup winners. Forty additional cash awards and prizes were presented last year in the tournament.

FROM THE RECORD:

The CRT rate hike

Editor's Note: The Copyright Royalty Tribunal's decision to raise the compulsory jukebox royalty rate appeared in the Federal Register *January 5, 1981 (pages 884-891). In that published decision, the CRT set forth its reasons for raising the $8 per jukebox copyright royalty rate to $25 in 1982, to $50 in 1984, and then even higher for "an inflationary adjustment" in 1987. The following are excerpts and condensations from the text of that decision as published.*

Summary of positions

ASCAP (SESAC's case was presented also by ASCAP) stated "they felt compelled to determine a compulsory license fee similar to the fee which would be reached on the open marketplace if performing rights societies and jukebox operators were free to negotiate for license absent a compulsory license.

"With that benchmark, they concluded that the most useful approach in reading the marketplace value was to use close [*sic*] marketplace analogies. These analogies were used: (a) general establishments, such as bars, grills, restaurants, and taverns using mechanical music (i.e., music provided by non-live means); (b) background music services; and (c) foreign jukebox operators."

On general establishments, such as bars, etc.—"The lowest such fee for ASCAP alone is $70. When the fees for BMI and SESAC are added, the total minimum fee paid by such establishments is $190. Dr. Fagan (ASCAP's chief economist and director of special programs) stressed there would be an administrative savings if all three repertories were licensed at once, estimating the resulting total minimum license fee at $140."

On background music services—"The annual rate charged by ASCAP alone for locations similar to those in which jukeboxes may be found is $27. This rate, however, was described as an interim fee subject to retroactive adjustment to 1971. Assuming that the rates were adjusted only for inflation, Fagan said that it would be $52.08 in 1980."

On the foreign jukebox operator analogy—"The average fee paid by jukeboxes in the nineteen countries ASCAP surveyed is $96.33 and the mean is $70.92. Dr. Fagan further testified that the proposed $70 fee is one that coin machine operators can afford, amounting to only 19 cents per day."

BMI proposed a royalty rate that "follows directly from the legislative history and the statutory mandate requiring balancing of economic considerations Therefore, BMI applies historical changes in the consumer Price Index to the $19.70 base specifically recognized by Congress as a reasonable fee. Application of the CPI from 1975 to the $19.770 base results in a royalty rate of approximately $30, adjusted annually."

The AMOA presented its case "through the testimony of eleven witnesses and the submission of thirty exhibits, the principal one being Exhibit #10, the Peat, Marwick, Mitchell and Company (PMM & Co.) survey of the economic condition of the jukebox operators' business.

"AMOA contends that there has been a marked increase in recent years in the numbers of amusement games that are in operation, especially in contrast to the decline in number of jukeboxes that are in operation and that many operators do not segregate their operating expenses for jukeboxes and games."

"The PMM & Co. survey indicates that for the industry at large, 18% of the boxes in operation earned for operators less than $300 per year, and that 47% earned less than $700 per year. For smaller operators of fewer than 40 machines, 23% of the boxes earned less than $300 per year, and 57% earned less than $600 per year."

"Jukebox operator witnesses offered testimony reflecting a continuing decline in the numbers of jukeboxes that are in operation, citing two basic causes for the decline: (1) the operators' inability to increase prices per play so as to keep up with the rate of inflation, and (2) the loss of jukebox locations due to socio-economic changes such as urban redevelopment and replacement of jukeboxes by other means of entertainment such as background music, radio, television, discos, and live entertainment.

"The AMOA, citing evidence of the decline in the jukebox operating business, decreasing revenues and margins of profit, and industrywide reduction in numbers of locations and of jukeboxes in operation, argued strongly that the $8 royalty fee should be left unchanged."

Performing rights societies' financial data

"AMOA sought to bring into issue in this proceeding the manner of how the performing rights organizations distributed jukebox royalties to their affiliates and members. AMOA argued that the Copyright Act called for an investigation of the performing rights organizations' distribution methods."

"Finally AMOA argued that there is no logical way the Tribunal can determine if a change should be made in the compensation that is to be provided without calculation of the specific compensation to individuals. Under AMOA's approach, this was the only way that the "fair return" standard of the Act could be met.

"In summary, AMOA's position in essence was asking the Tribunal to establish the value of individual musical works based on the time and expense incurred by the songwriters for each one, together with a value inexplicably derived from the placement of a work on a popularity chart. It then asks the Tribunal to investigate the internal distribution procedures of the performing rights organizations to establish the exact payout for each member or affiliate. A comparison of the two calculations—the costs and the payout—would, according to AMOA, produce the "fair return" calculations supposed-

ly required by the Copyright Act.

"BMI argued that the language cited by the AMOA 'to afford the copyright owner a fair return for his creative work,' reflects the broad goal of the legislation to insure that creators are fairly compensated through adoption of license fees establishing a reasonable value for the use of the copyright works.

"We [the CRT] agree. The language in the statute is not a directive authorizing the Tribunal to investigate individual members or affiliates collections from the performing rights organizations.

"We find that there is no indication either in the statute or the legislative history, that Congress intended the Tribunal to calculate rates or returns for each piece of music and then base royalty adjustments on these rates of return.

"We find nothing in the Copyright Act or its legislative history which indicates that the Tribunal was intended to regulate the internal operations of the performing rights societies. In our opinion the Tribunal's authority is strictly limited to setting applicable royalty fees and establishing the distribution to claimants."

Determination of the rate

"The Tribunal finds that the case presented by the AMOA, including the industry survey, has failed to provide reliable data concerning the operating expenses, revenues, or even return on investment of jukebox operators.

"The Tribunal convened a conference of the parties on February 13, 1980 in order to permit the Tribunal and all of the parties to make suggestions concerning the contents of a questionnaire which would be used by the AMOA to survey the financial condition of jukebox operators. At that conference the representatives of the AMOA stated that it was too late to revise the questionnaire.

"We note the limited response rate to the questionnaire, estimated by Peat Marwick to be approximately 14%. Dr. John Scarbrough, the Peat Marwick manager in charge of the survey, testified: 'I wouldn't argue very hard if you wanted to say that it was not a good response.'

"The record of this proceeding contains detailed testimony reciting the procedures utilized in the preparation and distribution of the questionnaire, which presents significant questions as to the survey's methodology and objectivity, as well as the nature and scope of the data provided."

The CRT also noted that the survey findings were not consistent with other evidence in the record, including other industry surveys, such as the one conducted annually by PLAY METER magazine.

"We have reviewed the testimony of the AMOA witnesses—five jukebox operators, representatives or distributors of the three American jukebox manufacturers, a 'one-stop' distributor of records, and a trade association official. We find that this testimony does not provide a basis for forming any representative picture of the jukebox industry nor does it create a foundation for the industry's claim of economic hardship. The testimony does establish an industry practice to turn over 50% of the gross revenues from jukeboxes to the location owner.

BMI's proposal to apply the CPI to a proposed $19.70 rate that was mentioned in a congressional committee report was ruled by the CRT to be "not in accord with our statutory responsibilities in this proceeding."

"In reaching our determination in this proceeding, we found the ASCAP/SESAC concept of basing the rate on marketplace analogies to be the most attractive. We have examined the three marketplace analogies urged upon us by ASCAP/SESAC—the license fees paid by general establishments using mechanical music, background music services, and foreign jukebox fees. These analogies, individually and collectively, are subject to limitations and distinguishing features. We believe that certain distinctions set forth in the AMOA pleading have validity. While acknowledging that our rate cannot be directly linked to marketplace analogies, we find that they serve as an appropriate benchmark to be weighed together with the entire record and the statutory criteria.

"We find that a per box payment of $50 is a reasonable fee for the jukebox industry as a whole. We have phased in the rate to accord the jukebox industry opportunity to adjust, since in our view the jukebox industry has never peviouslt paid reasonable compensation for the use of copyrighted music. We note that ASCAP/SESAC, in their proposed findings, concluded that an interim fee would be appropriate 'to afford the coin machine industry an opportunity to adopt to compulsory licensing at marketplace rates.' Consequently, the adjustment of the jukebox rate on January 1, 1982 will be limited to $25.

"We are aware that some jukebox operators function on a narrow profit margin, and that certain jukeboxes produce modest revenues. The Tribunal is satisfied that adequate attention has been given to the small operator, including the adoption of an amendment to the proposed fee schedule that was proposed for the benefit of such operators."

Maximize the availability of music

"We do not maintain that the jukebox rate is crucial to assuring the public of the availability of creative works. As has been observed in the pleadings, musical works were created and exploited for many years, during which, in our view, songwriters and publishers were unjustly denied reasonable compensation for a commercial use of their works. We concur in the ASCAP/SESAC finding that 'reasonable payment for jukebox performances will add incrementally to the encouragement of creation by songwriters and exploitation by music publishers, and so maximize the availability of musical works to the public. We find nothing in this record which would justify any reasonable concern that the schedule we have adopted will deprive the public access to music."

"We reject the contention that copyright owners are paid for jukebox royalties derived from record sales. We recognize that performing rights are distinct from recording rights. The Congress has determined that copyright owners are entitled to be paid reasonable fees for both. The Tribunal also rejects the contention that no adjustment of the royalty fee should be made unless the copyright owners established their 'need to receive' an increase.

"We have given our analysis of the testimony presented by the jukebox industry. We find nothing in that testimony which would warrant a conclusion that our schedule will deprive the jukebox operator a fair income under existing economic conditions."

"On the basis of the record in this proceeding, we have no basis for concluding that jukebox operators and owners of establishments with jukeboxes make any unique or distinctive contribution concerning creativity, technology, capital investment, cost, risk, and the opening of new markets for creative expression and media for their communication. We find in this record no

basis for a conclusion that the efforts of jukebox operators through their selection of records and their performance promote the dissmination of songs in any significant manner."

"On the other hand, the contribution of the copyright owner whose works are performed under the compulsory license directly benefits the jukebox operator and location owner."

"We cannot on the basis of the evidence presented by the jukebox industry find that our schedule will have a disruptive impact on the structure of the jukebox industry or disturb generally prevailing industry practices. By introducing the fee schedule in two phases, we have, in our view, adequately reflected in our decision the objective of this statutory criteria. The jukebox industry pays reasonable market prices for all other goods and services they require. We hold that they can pay the schedule we have adopted for the central commodity of their boxes without adverse impact."

Garcia's dissenting opinion

CRT Commissioner Frances Garcia stated, "It is my considered opinion and thus my conclusion that the royalty rate increase should have been $30 and $60."

James' dissenting opinion

CRT Chairman Clarence James stated, "Evidence offered by ASCAP indicated the minimum fee for an establishment which uses tape recorders, record players, or free jukeboxes is $70. Evidence offered by BMI indicated that the minimum fee is $60 per year. SESAC offered no evidence in this regard. Further, the evidence indicated that the maximum fee for ASCAP for this type of establishment is $490, and for BMI $240. Combining the minimum for both ASCAP and BMI would result in an annual fee of $130. This evidence was uncontroverted or refuted by AMOA."

"In essence, the majority [of CRT members] reached a conclusion on the premise that a true market value rate would result in too large an increase in fees. The majority was set on course by what they deemed were the guiding standards of the statute which referred to minimizing the disruptive impact on the economic structure of the industries involved. It was the majority view and opinion that a large increase in fees would be oppressive to the industry and would 'impact on small operators.' In my opinion, the majority misconceived the evidence in the record when this standard was applied. First, it is apparent that the standard was applied only to jukebox operations. There apparently was no consideration given to significant disruption in existing market prices for performing rights societies, fees paid by other analogous music users. The majority, in essence, appears to have reached a conclusion based on an ability to pay theory.

"The real economic impact of increased fees on jukebox operators cannot be determined from this record. Economic data supplied by AMOA was of questionable validity and could not be used as a basis for any rate determination. In addition, the record simply does not support AMOA testimony that jukebox operators are destitute or will go out of business if fees are increased.

"In fact, the evidence is clear and convincing to the contrary. The record in this proceeding shows that the coin machine operators pay a fair market price for all goods and services they may use. Further, it has been established in the record that jukebox operators have traditionally shared one-half of the gross revenue with a joint venture partner who neither contributes to the venture nor takes any risk. This arrangement is neither bargained nor negotiated but is traditionally given away. How is it that jukebox operators can claim destitution or inability to pay a fair and reasonable rate, when for years over one-half of their revenue has been given away? Even the small operators, the concern of the majority, split revenue 50-50 with the establishment owners. Is it appropriate for jukebox operators to come before this Tribunal and claim economic hardship? In my opinion it would be far better to reanalyze or reevaluate the traditional practice of giving away one-half of the revenue than to seek economic redress from this Tribunal.

"The rate established by the majority is not reasonable. Nor does it afford the copyright owner a fair return for his creative work. There is no evidence in the record to support the rate, no logic behind it, and no equity in it.

"In my opinion, the record is replete with evidence that the maximum reasonable marketplace value fee should be $130, not $25 or $50. I find that the record is void of any valid argument that once a reasonable rate is established there should be a discount because of economic hardship. There is simply no probative evidence in the record that jukebox operators should not or cannot pay rates comparable to thos paid by other analogous music users for the same product." ‡

Bally earnings, revenues high in '80

CHICAGO—Bally Manufacturing Corp. in the year ended December 31, 1980 logged record earnings and revenues for the fourth consecutive year.

Robert E. Mullane, chairman of the board and president of Bally announced that for 1980—which also marked the fifth straight year of increased earnings and revenues—net income was $53.5 million, up more than 15 % from the previous record high of $46.3 million earned in 1979. Earnings per share for 1980 were $2.01, 16 % above the $1.73 per share reported a year ago.

Investment tax credits included in Bally earnings were $1.4 million (5¢ per share) in 1980 compared to $7.8 million (29¢ per share) in 1979. Exclusive of investment tax credits in both years, 1980 per share reflected an increase of 36 % above 1979. Revenues for the year were a record $690.1 million compared to $386.2 million in 1979.

Mullane commented on the year's results: "Earnings and revenues from Bally's manufacturing, distributing, and equipment operating divisions were at record levels. In particular, Midway Mfg. Co. and our Aladdin's Castle family amusement centers both reported substantial increases in earnings and revenues."

Results at Bally's 83-percent owned Park Place hotel/casino in Atlantic City were termed "disappointing." This branch contributed $2.1 million to 1980 earnings, or 8¢ per share. Escalating operating costs in the emerging Atlantic City casino were cited for the Park Place showing—but Mullane alluded to favorable New Jersey rulings as boding well for future earning prospects there.

On Bally's outlook for 1981, Mullane said: "We fully expect continued strength in Bally's manufacturing, distributing, and equipment operating divisions and a substantial improvement in the operating results of Park Place."

Taito taps Pugh

Taito America recently appointed Mark Pugh, CPA, to the newly created position of vice president of finance.

Pugh most recently was controller for Williams Electronics. Two and a half years previously, he was staff superviser for the accounting firm of Arthur Young and Company.

Taito's President Jack Mittel said, "The professional respect Mark has earned in the financial community and the coin industry makes him the most logical choice for this position. His talent, youth, and dynamic drive are qualities that are self-evident."

Pugh said, "Taito's recent unprecedented growth will prove to be both a challenge and incentive. It will be a pleasure working with a company of Taito's scope and magnitude."

Pugh received his B.S. degree in accounting from the University of Illinois. He resides in the Chicago suburb of Arlington Heights with his wife, Sueann.

A recent cocktail reception was held by Worldwide Distributors of Chicago for Stern's new Freefall *pinball and* The End *video games. Shown testing the latest in play action, from the left, above, are Worldwide principals Nate Feinstein, Harold Schwartz, and Fred Skor, with Stern reps Tom Campbell and Ben Rochetti.*

Pugh

Angelo

Atarians are lined up

Atari, Inc. recently announced personnel appointments in its marketing and production departments.

Jeanne Angelo was named sales administrator for the Atari Marketing Department. She will report to Don Osborne, national sales manager.

Mariann Layne comes to the coin-op division of Atari as marketing services supervisor.

In a related announcement, Marketing Director Frank Ballouz said Mary Takatsuno has been promoted to market research supervisor.

Leslie McFarland has also joined the marketing department as junior research assistant.

Noan Anglin, Atari VP, announced the appointment of Tom Thompson as plant manager of the newly formed Atari Wood Shop, which is expected to open in the summer of 1981 in the Milpitas area of northern California.

World Wide shows the games

CHICAGO—The first mini-showing by World Wide Distributors was held on February 12 at Como Inn Restaurant and was reported by Fred Skor, president and chief executive officer, to be a "huge success.

In spite of harsh weather and difficult driving conditions, 89 operators attended the showing. "All expressed their enthusiastic approval of the friendly atmosphere," said Skor. He was talking about the atmosphere *inside* the Como Inn, of course—the cocktails and refreshments, as well as the games on display.

World Wide personnel on hand to greet the visitors were Nate Feinstein, Harold Schwartz, Howard Freer, Bill Atwood, Jeff Neumann, Joe Carone, Bob Cristo, Garry Ney, Jerry Richards, Larnell Green, Lorriane Hansen, and Skor.

On display were Williams' *Black Knight* pinball and *Defender* video and cocktail table; Stern's *Berzerk* and *The End* games and its next pinball, *Free Fall*; and the Seeburg *Phoenix* phonograph.

Skor stated that the enthusiastic response shown by operators to the event will lead to several more World Wide showings in he near future.

Stern takes Canada handlers

Stern Electronics, Inc., Chicago, has announced the appointment of two Canadian distributors of Stern's Seeburg phonograph line.

Tom Campbell, Stern director of marketing said New Way Sales of Ontario, is now a full-line distributor of Seeburg jukeboxes.

Coastal Games Limited of Richmond, British Columbia will also distribute the Stern line of phonographs, Campbell said. This firm's mailing address is #105-3830 Jacombs Road, Richmond, B.C., Canada V6V 1N7; telephone: 604/270-9346). Don McPhee, president of Coastal Games, said the association with Stern is now effective.

New Way Sales, already a full-line distributor of Stern's solid state pinball and video games, is located at 2050 Kipling Ave., Rexdale, Ontario (telephone: 416/746-2255). Company principals are Jerry Janda, Jr., president; Paul Janda, vice president; and Bill Rosenfield, sales manager.

Play Meter Equipment Poll*

Survey results compiled through March 5, 1981.

Top Videos

THIS MONTH		LAST MONTH
1	*ASTEROIDS/Atari*	1
2	*PAC-MAN/Midway*	2
3	*GALAXIAN/Midway*	4
4	*BATTLEZONE/Atari*	3
5	*MISSILE COMMAND/Atari*	5
6	*BERZERK/Stern*	6
7	*SPACE INVADERS/Midway*	7
8	*STAR CASTLE/Cinematronics*	8
9	*DEFENDER/Williams*	9
10	*MOON CRESTA/Nichibutsu & Gremlin*	10

Others receiving votes: ASTRO FIGHTER (Gremlin), CARNIVAL (Gremlin), MONACO GP (Gremlin), PHOENIX (Centuri), RALLY X (Midway), SPACE FIREBIRD (Gremlin), STRATOVOX (Taito).

Top Pins

THIS MONTH		LAST MONTH
1	*XENON/Bally*	4
2	*BLACK KNIGHT/Williams*	3
3	*FIREPOWER/Williams*	1
4	*FLIGHT 2000/Stern*	2
5	*BLACKOUT/Williams*	5
6	*SPACE INVADERS/Bally*	7
7	*GORGAR/Williams*	6
8	*FLASH/Williams*	14
9	*ALIEN POKER/Williams*	12
10	*FLASH GORDON/Bally*	8

Others receiving votes: FORCE II (Gottlieb), KISS (Bally), METEOR (Stern), NINE BALL (Stern), SCORPION (Williams), SILVERBALL MANIA (Bally), STELLAR WARS (Williams).

*Equipment Poll will be a continuing feature of PLAY METER NEWS EDITION.

If you would like to join readers currently participating in the survey, simply fill the coupon below and mail to: *Play Meter Equipment Poll, P.O. Box 24170, New Orleans, LA 70184.*

NAME _____

COMPANY NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

music programming

By Patrick Matthews

Quasi-scat and a country roll

They're still making records, but they just don't seem to be making the "noise" they once did. The "they" in question is or are the Brothers Johnson. Oh, sure the funk is still in your face, but the beat just doesn't seem "Right On Time" anymore. What we do have is the Eighties version of those funky brothers-Linx is the name of the group and they're no relation. Maybe that's a plus.

You're Lying—Linx—Chrysalis/CHS2461

An opening of quasi-scat singing begins a subdued funky bass run which carries the song. It's the debut single from the first album release of what could be a string of successes—if this initial record is any indication. Shades of disco make this one a dance natural. The infectious chorus invites a sing along, too. Could crossover to pop charts; *9 out of 10* on highest chart.

Games—Phoebe Snow—Mirage Records, Inc. (Atlantic)/WTG3800

It does seem like Phoebe was on Columbia forever, but she's moved her fluttering vocals and introspective compositions to a different New York City address—and this new label will probably be the better for it. The ironic part of this is: she didn't write the debut release on the new label, but an old friend, Richie Cannata (Billy Joel's sax man) co-produced. A bit more electric and synthesized than her previous stuff, it's a very nice way to say "Amen". An interesting arrangement is a definite strength of this one; plus some long-awaited powerful vocals from Ms. Snow; *8 out of 10* possibility.

I Loved 'Em Every One—T.G. Sheppard—Warner/Curb/WBS49690

Here's a perfect example of what can happen when Soul meets Country. The "soul" is in the piano and bass tracks and the combination is so staggering that the record could crossover to the Pop charts. This will all make sense after one listen. Sheppard has a big following and despite the chauvinistic subtleties in the lyrics, he shouldn't lose any of his female following; *10 out of 10* on highest chart.

Cowboys Don't Shoot Straight (Like They Used To)—Tammy Wynette—Epic/19-51011

Let's not stop now—we're on a

country roll. Everyone has his or her own opinion, but to some this lady *is* Country Music. At any rate, she certainly has made her contribution and this one could be one of her greatest; not just to music, but to the women of the world. "...it's just wham bam and thank you mam..." Get the picture? Get the record; *10 out of 10,* country.

Being With You—Smokey Robinson Tamla/T54321

The last time he had a hit was over a year ago. The song was "Cruisin'" and at the time everyone thought Smokey was back to stay. But the follow-up single and the subsequent album were disappointments and everyone forgot him again. Well, it's time to remember—again. William Robinson, Jr. *is* back with the title track from his latest Tamla release. The song is like a breath of fresh air and is a great way to get into the Spring of 1981. And it's what's known in the radio biz as great ammunition to start the Spring ratings sweep; *10 out of 10* on Pop and R&B charts.

Unchained Melody—Heart—Epic/19 51010

The Wilson sisters, fresh from their re-make success with "Tell It Like It Is", which was a studio version, is now out with a live cut from their latest lp. It's another remake and a butcher job at that. Getting to the "heart" of the matter—it stinks. The song is a ballad, a classic—and wasn't meant to be screamed. If this record hits the charts it'll only prove what most people think anyway—kids will buy anything that's noisy. I can't find it my "Heart" to give this a rating.

I Can't Stand It—Clapton & His Band—RSO/RS1060

This could be said about the song I just reviewed, but not about this one. What E.C. has here is one of his more commercially viable records in recent memory. Nice guitar work (natch) highlights this up-tempo blues tune from the just released *Another Ticket* lp. The theme is a bit redundant, but hasn't it always been? Good time blues-rock at its best; *8 out of 10* or better.

The records are rated as follows: 10 out of 10 — Top Ten peak; 9 out of 10 — Top 20 peak; 8 out of 10 — Top 30 peak; 7 out of 10 — Top 40 peak; 5 or 6 out of 10 — somewhere in Top 100; 4 or less — *forget it,* loser, break in half. •

AMOA mum on juke royalties

continued from page 1

(and that would rise to 8¢ per record under the CRT's recent rate ruling), Droste termed it a "double burden on them." The association has computed no figures on the dollar-impact, he said.

However, the averages derived from the most recent Play Meter Industry Survey show a total of $576 annual impact on the average operator—buying 3.3 records per week for the average of 42 boxes per operation and paying the new mechanical rate of 8¢ per record.

The Recording Industry Association of America (RIAA) has appealed to federal appeals court the CRT decision to raise the mechanical rate. The CRT ruled on December 19 that the mechanical royalties rate of 4¢ per song (8¢ on a 45 rpm record) would go into effect July 1. RIAA has contended that the increase will depress record sales, affecting the recording artists as well as the record industry. AMOA entered the federal court appeal as a party to argue the operators' case in this matter.

AMOA has spent approximately $100,000 to wage its legal fight during the past year, Droste confirmed.

At late February, the funds were "near zeroing," said Droste.

On the question of whether to go back to the Congress for new laws in copyright royalty matters, there has been no official AMOA position, he said —noting however that some members and state associations have urged lobbying for new legislation.

These issues may be discussed in the Board of Directors' April 12 annual meeting in Monterey, California. However, no agenda was provided to PLAY METER when requested of the executive office.

Rock-Ola 'effective' vs. copiers

continued from page 1

"This legal victory was particularly significant inasmuch as Video Games' lawyers had earlier attempted to block the injunction by filing a protective motion and summary brief with the court."

The State Court in Frankfurt injoined the German firm from the further distribution and sales of the game under the name *Space Castle*..

One source told PLAY METER that the ruling marked new ground in the battle of manufacturers over proprietary rights in video games, and that it was a landmark against "the anarchy in this business."

It was believed to be the first time an American manufacturer had won a judgement in an European court over disputed game rights.

A similar issue had come to light during the British show during January. Williams Electronics had been successful in banishing an alleged copy of its video *Defender* from the show floor by court order.

An out-of-court settlement was made in the Rock-Ola matter at late February, in which Video Games Gmbh agreed not to contest the court order. In addition, certain guarantees were extended to Rock-Ola as well as payment of damages for an undisclosed amount of money, the Chicago manufacturer divulged.

Dr. Rockola said, "With swift legal action in Frankfurt, Rock-Ola has very convincingly demonstrated that it is very dedicated to protecting its proprietary interests, as well as those of its franchised distributors, and those of the industry in general—because this benefits the coin-op industry generally."

He continued, "We have been very effective in persuading seven other European importers and distributors to withdraw other copies of *Star Castle* from the market." Legal action was in process in Britain, France, Italy, Japan, and Canada, Dr. Rockola indicated, to protect the rights to the game.

He told PLAY METER, "Unless the industry comes to terms with this severe problem, this industry will die on the vine," due to the high costs of game development as opposed to the copying problem avowed by manufacturers.

Rock-Ola made its first video game with *Star Castle* under Cinematronics licensing for the export market. In the offing are two new games from the Chicago manufacturer known for jukeboxes.

Despite the copying hassle, said Dr. Rockola, *Star Castle* sales abroad are "very good." He estimated, however, that the number of unauthorized copies that were being produced daily in Europe topped 1,000 for this game alone.

—by Ray E. Tilley

Taito ties with Nichibutsu USA

Taito America Corp. recently announced its license agreement with Nichibutsu (USA) Ltd. for the exclusive North American rights to manufacture and sell *Crazy Climber* in both upright and Taito's Trimline versions. The announcement was made at Taito's new Elk Grove Village, Illinois facility by Jack Mittel, president of Taito America, and Sueharu Torii, president of Nihon Bussan, Ltd., the parent company of Nichibutsu USA.

"Crazy Climber" is a refreshing new theme in video games," said Mike Von Kennel, Taito's sales manager. "In this light-hearted yet challenging, talking video, the player must scale four different sky-scrapers, each one more difficult than the last, as he avoids unique obstacles such as gorillas, birds dropping eggs, and debris thrown out of windows."

"It's a skill action game that will challenge all players, said Taito Vice President Paul Moriarity. "And with our new Trimline model, *Crazy Climber* will be greeted in a wider variety of locations than ever before."

Mittel said, "We're going all out, with special promotions and advertising. Our test locations' income supports the fact that *Crazy Climber* is one of the top games in the world market, and we are pleased to be working with Nichibutsu."

Crazy Climber would be available at distributor showrooms in March, in time for the Spring sales season, according to Taito America. •

Nova Apparate sets its course

continued from page 1

in Europe (except the Benelux countries), as well as Gottlieb pinballs from the United States to Germany and Austria.

In the vending business, Nova relies above all on the coffee vendors from Coffee-Mat (U.S.A.) and can vendors from Rock-Ola (U.S.A.). In this connection, Nova has established an important ingredients business with coffee, hot chocolate, etc., of its own brand.

In the course of the ever-expanding video games business, Nova has taken on distributorships of prominent manufacturers in the United States and Japan (Atari, Taito, GDI).

The founder, main shareholder, and chairman of the Gauselmann-Automaten Group, Paul Gauselmann, has been known to A.W. Adickes for more than twenty years as a successful and dynamic entrepreneur.

While maintaining its independence within the Gauselmann-Automaten Group, Nova Apparate will remain an import/export company, looking after the international business with special regard to imports from the United States and Japan. Nova will sell these imports games throughout Europe and most of Germany via its network of distributors and in northern Germany directly to operators.

With the acquisition of this import company, The Gauselmann-Automaten Group strengthens its position as one of the leading enterprises in the coin machine industry with 300 million DM. Operating from headquarters in Hamburg, Nova is managed by president and co-partner Hans Rosenzweig. Rosenzweig has been involved for many years in the leisure industry, both domestically and internationally. Adickes will stay on with Nova as a director until the end of 1981 and then in the following years as a consultant, particularly for the international business.

"Nova Apparate is pleased to join forces with Gauselmann-Automaten Group and anticipate an even brighter future in the expanding leisure industry," said a Nova spokesman. •

Operators Would Rather Go to Las Vegas

In a recent poll of amusement operators, PLAY METER found the majority favoring Las Vegas as the site of the 1982 AMOA convention and trade show. Of the operators responding to the Play Meter Equipment Survey, 57 percent said "Yes" to Las Vegas, 18½ percent answered "No" to the choice of Las Vegas, and 24 percent had "no opinion" about the site.

In the manufacturing sector of the industy, however, many games producers recently expressed objections to Las Vegas. The manufacturers said they fear an inevitable link will be drawn between amusement games and the gaming sector in the public's mind and in mass media's coverage of the AMOA show in Las Vegas. ‡

They come, they play, they conquer rec therapy

SUNNYVALE—Atari's game room at its Borregas Avenue headquarters, where all of its coin-op games are set on free play, recently served as site of what the staff at Stanford Children's Hospital in Palo Alto, California refer to as recreational therapy.

The hospital staff often bring small groups of young patients to Atari for an evening-out in recreational therapy. The children enjoy playing the games, and the staff agree that the trips to the Sunnyvale plant help to release some of the tension that hospitalized children are subject to.

The Stanford Hospital has a mini game room of its own with Atari's *Breakout*, *Superman* pinball, and *Touch Me* games. Soon, an *Asteroids* will be added to this collection, due to the efforts of Michelle London, director of recreational therapy at the hospital.

Contributions to buy the game came from the Woodside-Atherton Auxiliary and from country singer Willie Nelson. *Asteroids* was chosen as the new game for the hospital's rec room by the hospital staff and based on the reaction of the kids, who chose the game as their favorite, spokesmen said.

Frank Ballouz, Atari director of coin-op marketing, commented: "Atari is proud to have the opportunity to serve the community in this way. Our games can be more fun when they are used to benefit a special program such as this one.

Gottlieb tags new team

NORTHLAKE, Ill.—Major additions and realignment of personnel as well as projected expansion into new product lines have been announced by D. Gottlieb & Co.

The personnel moves were aimed at strengthening the company's product development and marketing capability, said Robert W. Bloom, president of the amusement games manufacturer.

Gilbert G. Pollock, formerly vice president/operations, becomes vice president/product design for Gottlieb.

C. Marshall Caras, veteran coin machine industry sales executive, becomes vice president/marketing, a position he formerly held with Gottlieb in 1977-78.

Howard Rubin, marketing and product development specialist who has been affiliated with Atari, Inc. on both coasts during the past four years, becomes vice president/product management.

Bloom, in commenting on the appointments, said: "As a company grows and expands its product lines, the need for fresh, innovative talent as well as more vertical specialization becomes evident. As the industry knows, we have recently changed from a single-product

Pollock

Caras

games manufacturer to a multi-product company with the addition of our line of video games—and we are considering expansion in other directions. These appointments will add immeasurably to our product and sales potential for the future.

It is a great personal pleasure for me to be able to welcome Marshall Caras back to Gottlieb where we pre-viously worked together in such a satisfying relationship," Bloom continued.

"Marshall, having been a prominent distributor himself, knows the business from both sides of the desk, and I know that our distributing organization will welcome the understanding and skill that he brings to our prime marketing position.

"Howie Rubin gained my respect as a knowledgeable industry figure from the first time we became acquainted. His knowledge and experience will enhance Gottlieb's ability to develop and bring to the market outstanding amusement games," said Bloom.

"Gil Pollock has been concentrating on the area of product design for several months, and the success of his effort will soon be apparent. His new position is designed to relieve him of the former administrative responsibilities to assure the continued momentum and direction he has established in Gottlieb product design."

In addition to these appointees, Art Strassenberg, director of manufacturing, and Dick Finger, director of engineering, will report directly to Bloom, he said. "Vice President Tom Herrick, also reporting to me, will continue his activities in the field of market research, promotion, advertising, and public relations and will assist Marshall during this period of transition," he added.

"The net result of these appointments and changes," concluded Bloom, "is to considerably strengthen our product development and marketing teams. It should be apparent to even a casual observer of the industry that Gottlieb is going to be heard from in 1981." •

Top officers appointed at Bally

CHICAGO—The elections of James M. Rochford and Walter Wechsler to Bally Manufacturing Corporation's board of directors were announced recently by Robert E. Mullane, chairman of the board and president.

Rochford has been vice president of corporate affairs and governmental relations for Bally Manufacturing since April of 1980. He has served as vice president of corporate security since 1977.

Wechsler has been a member of the board of directors of Bally's Park Place, Inc. subsidiary and a member of its audit committee since the casino/hotel opened in December of 1979.

In announcing the appointments, Mullane said, "Bally Manufacturing is extremely fortunate to have the knowledge and experience of Jim Rochford and Walter Wechsler on its board of directors. Each will provide an integral and specific new dimension to the corporation's planned growth and development."

Prior to his current position, Rochford, a career law enforcement official, was superintendent of the Chicago Police Department from November, 1973 to October, 1977.

Wechler has been a government official in the State of New Jersey, holding the office of controller of the treasury and budget director, and in this capacity served as chief fiscal officer responsible for developing the state's fiscal plan. Wechsler also serves as a director of the United States Savings Bank of Newark, and a director of Yates Industries, Inc. of Bordentown, New Jersey.

Wechsler will continue as a member of the board of directors of Bally's Park Place, Inc.

Bally VPs named

Jerry A. Blumenshine and William T. O'Donnell, Jr. have been appointed as vice presidents of Bally Manufacturing Corp.

Blumenshine will continue in his position as corporate controller, a post he has held since 1974. O'Donnell, Jr. will also continue as president of Bally's Pinball Division, a position to which he was appointed in 1979.

Announcing the appointments, Chairman and President Robert E. Mullane said, "Their loyalty and dedication to our company have proven highly valuable to our corporate development, and I greatly look forward to many more years of their association with Bally."

Blumenshine, prior to entering his current post, served as assistant corporate controller from 1972 through 1974. A certified public accountant, he was previously employed by Arthur Young & Co.

O'Donnell, who has been with the company since 1971, was Bally's European director of marketing until his most recent appointment as president of the Pinball Division.

Digital Circuit Design Course

LESSON 5:

Emitter Follower Design

Editor's Note: The material below is a serialization of the Kurz Kasch correspondence course for electronics, designed specifically for the coin-operated amusement industry. This course is copyrighted and owned by Kurz Kasch of Dayton, Ohio and its reprinting is being sponsored jointly by Kurz Kasch and Play Meter magazine. This material is authorized for publication exclusively by Play Meter magazine.

The operation and design of emitter followers is the topic of this lesson. The circuit is analyzed both mathematically and graphically.

Definition: An emitter follower, or common collector circuit, is a circuit configuration in which the output is from the emitter to ground. In the case of the inverter, or common emitter circuit of Lesson Four, the output was taken from the collector to ground. The emitter follower is used primarily as a current amplifier. It is used in digital circuits to drive high current devices, such as lamps and relays, and also to drive low impedance transmission lines.

Emitter Follower Operation:

Figure 5-1 is a schematic diagram of an emitter follower. Notice that the collector is connected directly to Vcc and the resistor connecting the emitter to ground. The input to an emitter follower is from base to ground, and the output is from emitter to ground. The circuit operates as follows: During time, *t* less than 0, the input is at a low level (0V), the base is then zero biased, and the only current flowing is the leakage current. The leakage current is too small to cause a voltage drop across RE worth accounting for; therefore, all of the voltage is across the transistor, collector to emitter. This operating condition is graphically shown at point A on the emitter-follower load load line of *fig. 5-2*. At point A, VCE is approximately equal to Vcc and Ic is approximately zero. Because all of the voltage is across the transistor, the voltage across RE must then be zero.

The base-emitter diode will begin to forward bias at the knee in the curve of fig. 5-2, and this point is termed VBE(cutin). As a general rule—for silicon transistors VBE(cutin) = 0.5 V and for germanium transistors: VBE(cutin) = 0.1 V.

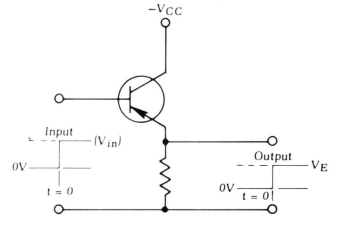


Fig. 5-1. An emitter follower circuit. The input and output waveforms are in phase.

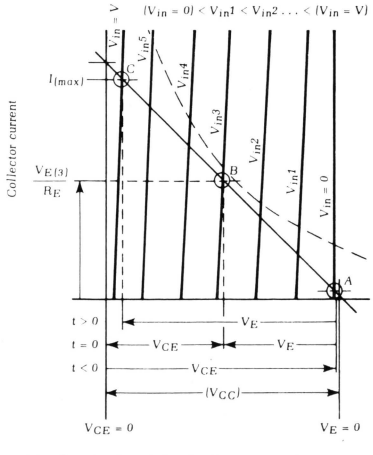


Fig. 5-2. The family of input-output states for an emitter-follower. The output voltage being the intercept of the load line with a particular V_{in} curve.

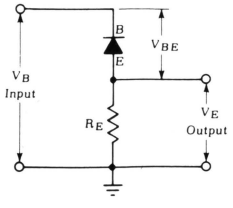


Fig. 5-3. An equivalent circuit of the input circuit of an emitter-follower. The output voltage is V_{BE} less than the input voltage.

At *t* = 0 the voltage [Vin] rises from 0V to a level high enough to forward-bias the base emitter diode, a current begins to flow in the emitter circuit [IE]. IE causes a voltage drop across RE which subtracts from VCE. The voltage dropped across RE will continue to rise with the input voltage and continue to subtract from VCF. Let us assume that Vin has risen to Vin3. This operating condition is represented at point B. Projecting the voltage intercept, we find that VCE has decreased and that VE has increased proportionately. The current Ic can be found by projecting the current intercept. Also, notice that Ic has increased. When the input rises to the steady voltage V, the emitter voltage will also reach a steady state voltage. This operating condition is shown at point C. Notice that VE has risen to almost Vcc and that VCE is almost zero. The steady state voltage across the emitter resistor [VE] will be equal to the input voltage minus the voltage base to emitter, or

$$V_E = V_{in} - V_{BE}$$

An equivalent circuit of the base-emitter relationship is shown in *fig. 5-3*. The diode represents the base-emitter diode. This illustrates clearly why the output voltage is VBE less than the input voltage.

Also, note from *fig. 5-1* that the input and output voltages are in phase.

Collector Dissipation:

Because the transistor is basically a resistive device, as current flows there will be dissipation and, therefore, heat. The effects of heat regarding VF and IR for a diode and regarding ICO for a

transistor have been previously discussed. Also, corrective measures have been devised. I_{CO} is a result of temperature increases both external (T_A) and internal (P_T) to the transistor. Internal heat is a result of the voltage collector to emitter (V_{CE}) and I_C.

$$P_T = V_{CE} \times I_C$$

Care must be taken by the designer not to operate the transistor beyond the manufacturer's stated maximum dissipation. As was the case with the diode, the manufacturer states a maximum dissipation on the data sheet. Included in the collector family curve on *fig. 3-6 A* (Lesson 3) and the emitter follower line of *fig. 5-2* is the curve P_T. The load line must be selected such that it will be within the area below the maximum dissipation curve. It should be noted that the curve is given for a T_A of 25° C. The manufacturer also gives on the data sheet the rate at which to derate $P_{T_{[max]}}$ at elevated temperatures. This derating figure is the same form as it was given for the diode in Lesson Two, and all calculations are done in the same fashion.

Design Procedure:
STEP 1: Find absolute value of I_E:

$$I_E = \frac{|V_{in}| - |V_{BE}|}{R_E}$$

The above is a general statement and applies to all design problems. In this course we are concerned with digital circuits only, so V_{CC} can be substituted for V_{in}. This substitution is allowed because the input levels for digital circuits are either 0V or V_{CC}. If the device being switched is in the emitter circuit, then $R_L = R_E$..

STEP 2: Find I_B.

$$I_B = (1 - \alpha) I_E$$

The formula for I_B is taken from Lesson One, formula [3].

STEP 3: Find I_C.

$$I_C = \alpha I_E$$

The formula for I_C is taken from Lesson One, formula [2A].

Design example:
Design an emitter follower which will drive a 6V, 150-omega lamp (the circuit configuration is shown in *fig. 5-1.*) Use a germanium transistor type 2N404.

STEP 1: Find $|I_E|$.

$$I_E = \frac{|V_{CC}| - |V_{BE}|}{R_E}$$

$$= \frac{5.7V}{150\Omega} = 38ma$$

Since the transistor is operating close to the saturation region, the general rule for $V_{BE_{[sat]}}$ can be used.

STEP 2: Find I_B.

$$I_B = (1 - \alpha) I_E$$

$$= 38ma\ (1 - 0.98) = 0.76ma$$

$$= 38ma\ (1 - 0.99) = 0.3ma$$

Notice that quantities of base current have been calculated, each associated with a different value of alpha. *The two values of* alpha *correspond to the high and low values of* beta *given in figure 4-7 (Lesson Four). The values of alpha were found by using formula 6 in Lesson One and the high* beta *value of 130 and the low* beta *value of 50. The student should verify the conclusions from beta to alpha. The range in base current illustrates the current amplifying ability of an emitter follower.*

STEP 3: Find $|I_C|$.

$$I_C = \alpha I_E$$

$$= 0.98 \times 38ma = 37ma$$

Formula 2A from Lesson One is used to find I_C. There is no need for concern as to which value of alpha to use, since the range is from 0.98 to 0.99.

End of Lesson Five

PROGRAMMED TEST/5

Instructions: *The purpose of this test is to guide you step-by-step through actual circuit design problems. Most important, these tests will provide you with a gauge to establish your degree of understanding of the material covered in the lesson text. The test is programmed: start at block 1 and follow the numbered instruction associated with your answer.*

1

The input to an emitter-follower is from
a. Emitter to ground
GO TO BLOCK 13
b. Base to ground
GO TO BLOCK 20

2 YOU ARE CORRECT!

The input and output voltages are
a. Inverted
GO TO BLOCK 21
b. In phase
GO TO BLOCK 11

3

$$I_E = \frac{23.3V}{500\Omega} = 46.6ma$$

Did you get the same result? If not, **do not** *go on, but check. Since in this case $V_{CC} >> V_{BE}$, V_{BE} can be ignored. Then the value I_E = 48ma. can be used.*

What is the range in I_B?

a. _____ ≤ I_B ≤ _____
GO TO BLOCK 19

4

I_C = 46ma or 47.5ma depending upon which value of alpha was used. In either case the difference will be very small.

You have completed the test for Lesson Five. You may want to breadboard the circuit and test your results.

11 YOU ARE CORRECT!

Design an emitter with an R_E of 500 omega.

Use a silicon NPN transistor with a range in beta from 25 to 100. Make V_{CC} = 24V and $V_{in} = V_{CC}$.

What is I_E?

a. I_E = _____
GO TO BLOCK 3

12 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 20.

13 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 1.

[Test continues on next page]

[Test 5 continued from previous page]

19

$0.48ma \leq I_B \leq 1.92ma$

The range in α was found to be: 0.96 ≤ α ≤ 0.99. Formula 3 from lesson one.

Did you get the same result? If not, do not go on, but check your calculation.

What is Ic?

a: Ic = _____ GO TO BLOCK 4

20 YOU ARE CORRECT!

The output from an emitter-follower is from

a. Emitter to ground
GO TO BLOCK 2

b. Collector to ground
GO TO BLOCK 12

21 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 2.

[End of programmed test for Lesson Five]

BREADBOARD PROJECT FOR LESSON 5:

Emitter Follower Design

1. "Wire up" the circuit in *figure 1* on the breadboard. Before applying power, set P to the full CCW position.

2. Apply power, -6V only.

3. The lamp should *not* light. The circuit is operating at A in *figure 5-2*. The base is zero biased and, therefore, $I_E = 0$. The only current flowing is I_{CO} which is too small to cause a voltage drop across R_E worth accountin for. A voltmeter (if one is available) would verify this fact.
The output is also at 0V since the voltage across the lamp is 0V.

4. Adjust the potentiometer slowly to about halfway to the CW position.
Note that the lamp begins to glow. The circuit is now operating at point B in *figure 5-2*, on the curve V_{in3}. The voltage from base to ground is, of course, about 3V. The voltage across the lamp is about 2.8 volts. (When the transistor is operating in the "active region," V_{BE} = 0.2V for germanium transistors.)

5. Set P to the full CW position. The lamp is now glowing "full" and the transistor is operating at point C in *figure 5-2*, on the curve V_{in} = V (where V equals -6V). The output voltage is now almost -6V

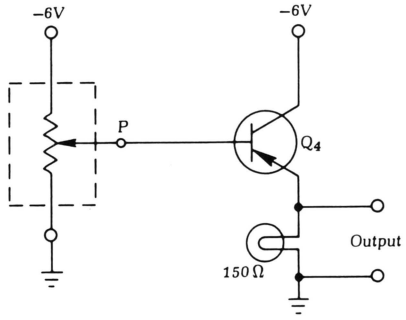


Figure 1

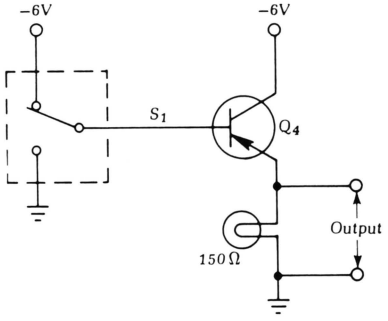


Figure 2

and the voltage drop across the transistor is about V_{BE}.
By performing this experiment, the student should have observed the fact that the emitter "follows" the base as the base voltage is adjusted up and down. Hence, the term "emitter follower." Secondly, he should have noticed that the input and output voltages are in phase.

6. Disconnect the power.

7. "Wire-up" the circuit in *figure 2* on the breadboard. Before applying, set S to the low (L) position.

8. Apply power, -6V only.

9. The lamp should *not* light. The circuit is operating at point A in *figure 5-2*, on the curve $V_{in} = 0$. The output is at a low level.

10. Set S_1 to the high (H) position. The lamp should glow. The circuit is now operating at point C in *figure 5-2*, on the curve V_{in} = V (where V_{in} = -6V). The circuit has made a rapid transition through point B.
The output is now at a high level and in phase with the input.

Sega had lower earnings in Japan in '80

LOS ANGELES—Sega Enterprises, Inc. reported net earnings of $3.2 million, or 45¢ per share, for the second quarter of its fiscal 1981, ending December 31, 1980. This compared with $4 million, or 55¢ per share, for the prior year's second quarter.

Net earnings for the second quarter included gains from translation of foreign currency denominated assets and liabilities into U.S. dollars and foreign currency transactions of $396,000, or 6¢ per share, versus $551,000, or 8¢ per share, in the fiscal 1980 second quarter.

Net earnings were $5.4 million, or 76¢ per share, for th six months ended December 31, as against $10.2 million, or $1.42 per share in the previous year's first half.

Revenues for the current six months fell to $74.4 million compared with $83.3 million for the same period last year.

The company's consolidated net earnings for the quarter were down as a result of a decline in net earnings from its Japanese business interests, the company announced. However, the company's U.S. business had record second quarter revenues and net earnings from the sale of its coin-operated electyronic video amusement games, said David Rosen, chairman of the board and president of Sega.

The company experienced lower revenues from games operated in Japan, as well as higher costs of games sold and operated in that country.

Sega is an 85-percent owned subsidiary of Gulf+Western Industries, Inc.

LESSON 6:

Diode Gate Design

A	B	X
0	0	0
1	0	0
0	1	0
1	1	1

AND Gate

A	B	X
0	0	0
1	0	1
0	1	1
1	1	1

OR Gate

Fig. 6-1. Truth tables for AND and OR gates. A 0 represents a low voltage level and a 1 a high voltage level.

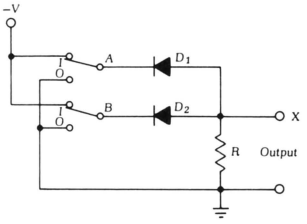


Fig. 6-2. A schematic diagram of a two input diode OR gate.

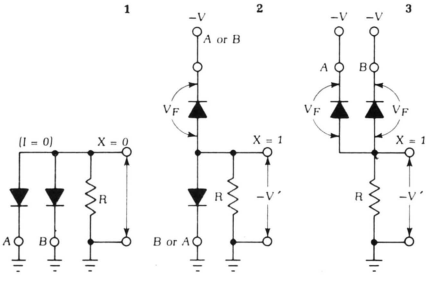


Fig. 6-3. A diagram of a diode OR gate with all of the possible input states.

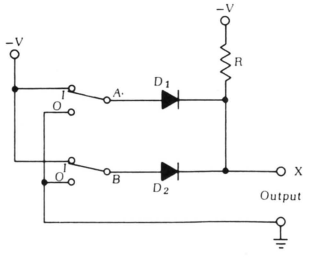


Fig. 6-4. A schematic diagram of a two input diode AND gate. The student should compare this circuit to that of the OR gate in Fig. 6-2.

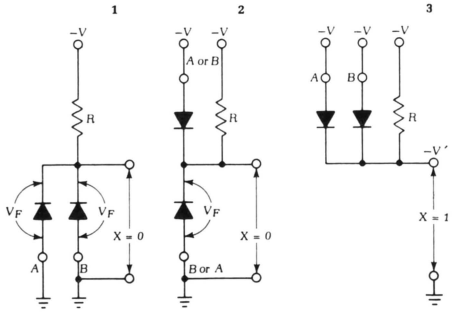


Fig. 6-5. A diagram of a diode AND gate with all of the possible input states.

This lesson will introduce the student to logic and truth tables as well as the design of diode gates. Both AND and OR gates are covered.

Logic Gates and Truth Tables:

Logic gates are circuits which have a single output and two or more inputs the state of the output is a function of a set of rules concerning the states of the inputs. For example, *the output of an AND gate is a high level if and only if all of the inputs are at a high level.*

The output state of an OR gate is a high level if one or more of the inputs is at a high level.

Instead of defining a logical operation in words, an alternative method is to define a *high level as logic 1 and a low level as logic 0.* Also, a truth table can be drawn. It will contain all possible input states and their corresponding output state. In *fig. 6-1* are the truth tables for two input AND and OR gates. The inputs are labled A and B and the outputs is labled X. Notice that the definitions given above are consistent with the truth tables.

Diode OR Gates:

The circuit in *fig. 6-2* is a diode OR gate. The circuit operates as follows: When both the A and B inputs are at a logic 0, both diodes are zero-biased, and no current flows through the resistor R. When no current flows, the voltage drop across R is, of course, zero. Therefore, the output X is a a logic 0. This condition isillustrated in *fig. 6-3*, section 1.

When either output A or B is at logic 1, a current will flow through R. When a current flows through R the output raises to a voltage V′ because of the voltage dropped across R. Therefore, the output X is a logic 1. It is easily seen in *fig. 6-3*, section 2, that V′ is V_F less than V. Also, notice that the current through the diode is 1 plus the leakage current (I_R) of the zero-biased diode.

The condition of both A and B inputs at logic 1 is illustrated in section 3 of *fig. 6-3.* Notice that I is now divided between both diodes and that output X is at a logic 1.

The student should verify that the operation of the diode OR gate in fig. 6-2 is consistent with the OR gate truth table in fig. 6-1. Fig. 6-3 should be used as an aid for translating the circuit to the truth table.

Design Procedure:

STEP 1: Determine $|V'|$.

$$V' = |V| - |V_F|$$

V_F is generally stated on the manufacturers' data sheets. However, as a general rule: V_F for silicon diodes # 0.6V, and for germanium diodes, 02V can be used.

STEP 2: Find I.

$$I = \frac{|V'|}{R}$$

Design Example:

Design a two-input diode OR gate where R is a 6V, 150-omega lamp. Use a silicone diode type 1N914. (The circuit diagram is shown in *fig. 6-2.*

STEP 1: Determine $|V'|$.

$$V' = |V| - |V_F|$$

$$= 6.0V - 0.6V = 5.4V$$

The general rule for silicon diodes is used.

STEP 2: Find I.

$$I = \frac{V'}{R}$$

$$= \frac{5.4V}{150\Omega} = 38ma$$

Diode OR Gates:

The circuit in *fig. 6-4* is a diode AND gate. The circuit operates as

continued from previous page

follows: When inputs A and B are at a logic 0, both diodes are forward-biased. When the diodes are forward-biased, V' equals V_F of the diodes. therefor, X is at a logic 0. Section 1 of *fig. 6-5* illustrates this condition. When input A or B i at a logic 1, the state of input X is at a logic 0 as shown in section two of the figure. However, when both inputs A and B are at a logic 1, both the diodes are zero-biased and V' then equals V. The output X is then at logic 1 as shown in section 3. Calculations for the AND gate are the same as for the OR gate of the previous paragraph.

The student should verify that the operation of the diode AND gate in fig. 6-4 is consistent with the AND gate truth table in fig. 6-1. Fig. 6-5 should be used as an aid for translating the circuit to the truth table.

A	B	X

Use this truth table to work problem.

End of Lesson Six

PROGRAMMED TEST/6

As in previous lessons' programmed tests, start at block 1 and follow the numbered instruction associated with your answer.

1

A circuit which generates a high level at the output only when all of the inputs are at a high level is called an:

a. AND gate — GO TO BLOCK 10
b. OR gate — GO TO BLOCK 20

2 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 10.

3 YOU ARE CORRECT!

Again referring to a truth table a low level at the input or output is called a

a. Logic 0 — GO TO BLOCK 12
b. Logic 1 — GO TO BLOCK 22

4

$$V' = V - 10 \times V_F = 10 - 6 = 4V$$

Because the input to the second gate is the output of the first gate and so on, the output of the chain will decrease as proportionate to the length of the chain. This fact puts a serious limitation on the use of the diode gates.

What is I?

a: I= _____ GO TO BLOCK 13

10 YOU ARE CORRECT!

A circuit which generates a high level at the output when any or all of the inputs are at a high level is called an

a. AND gate — GO TO BLOCK 2
b. OR gate — GO TO BLOCK 21

11 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 21.

12 YOU ARE CORRECT!

Design a two-input diode OR gate where R = 10K and V = 10V. Use silicon diodes.

What is V' or the output voltage when X = a logic 1 ?

a: V' = _____ GO TO BLOCK 23

13

$$I = \frac{9.4V}{10K} = 0.94ma$$

Did you get the same result? If not, do not go on but check.

You have completed the test for Lesson Six.

20 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 1.

21 YOU ARE CORRECT!

When using a truth table, a high level at the input or output is called a

a. Logic 0 — GO TO BLOCK 11
b. Logic 1 — GO TO BLOCK 3

22 YOU ARE INCORRECT!

Refer to the text and return to BLOCK 3.

23

$$V' = 10V - 0.6V = 9.4V$$

The general rule for silicon diodes was used.

Did you get the same result. If not, do not go on but check.
If there were a chain of ten didoes OR in series, what would V' be for the final stage?
a: V' = _____ GO TO BLOCK 4

[END OF PROGRAMMED TEST/6]

BREADBOARD FOR LESSON 6:

Diode Logic Gate Design

1. "Wire up" the circuit in *figure 1* on the breadboard. Before applying power, set switches S_1 and S_2 in the low (L) position.

2. Apply power, -6V only. The lamp should be lit.
When both inputs are at a logic 0, diodes D_1 and D_2 are both forward biased, and the output is a logic 0. This operating condition is illustrated in section 1 of *figure 6-5.*
The logic is shown in the top row of the Truth Table. It reads input A is at a logic 0 and input B is at a logic 0 and the output X is at a logic 0.

3. Set S_1 to the high (H) position. The lmp should remain lit.
When S_1 is in the high position providing a logic 1 at input A, diode D_1 is zero biased. However, D_2 is still forward biased, clamping the output to a logic 0. This operating condition is illustrated in section 2 of *figure 6-5.*
The student should state this logic condition in the second row of the Truth Table.

4. Set S_1 to the low (L) position and S_2 to the high position. The lamp should remain lit.
This operating condition is identical to the previous condition in paragraph 3. The exception being the states of D_1 and D_2 are reversed. The student should

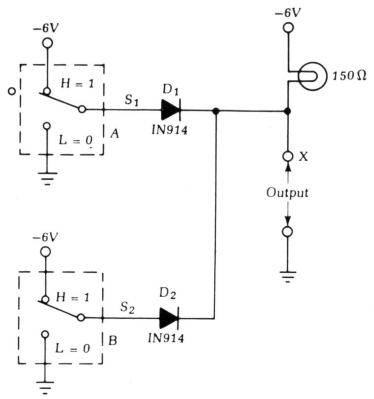


Figure 1

Truth Table

A	B	X
0	0	0

Table for figures 1 & 2

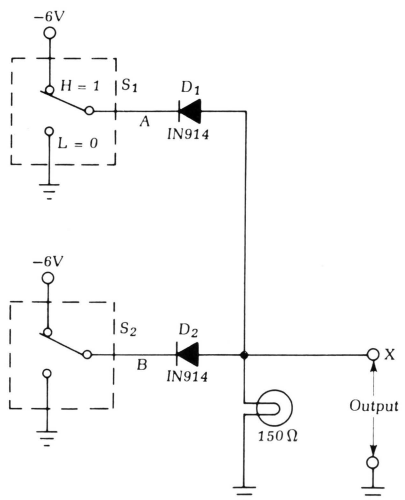


Figure 2

state this logic condition in the *third row* of the Truth Table.

5. Set S1 to the high (H) position. The lamp should *extinguish*.
Both diodes are now zero-biased and the output has risen to a high level or logic 1. This operating condition is illustrated in *figure 6-5*, section 3.
The student should state the logic condition in the bottom row of the Truth Table. When completed, the Truth Table should be the same as the one shown in *figure 6-4*.
This circuit has performed the operation AND.

6. "Wire-up" the circuit in *figure 2* on the breadboard. Before applying power, set switches S1 and S2 to the low (L) position.

7. Apply power, -6V only. The lamp should *not* light.
When both inputs are at a logic 0, diodes D1 and D2 are both reverse-biased and the output is at a lofic 0. The first row of the Truth Table states this operating condition. The operating condition is illustrated in section 1 of *figure 6-3*.

8. Set S1 to the high (H) position. The lamp should *light*. When S1 is in the high position, input A is at a logic 1. This operating condition is shown in section 2 of *figure 6-3*. The student should state this operating condition on the second row of the Truth Table.

9. Set S1 to the low (L) position and S2 to the high position. The lamp should remain *lit*.
When S2 is in the high (H) position, a logic 1 is applied to input B. The output has remained at a logic 1. Again the operating condition is shown in section 2 of *figure 6-3*. The student should state this logic condition on the third row of the Truth Table.

10. Set S1 to the high (H) position. The lamp should remain *lit*. Both inputs are now at a logic 1 and the output is also at a logic 1. Section 3 of *figure 6-3* illustrates this, operating condition. The student should state this logic condition in the bottom row of the Truth Table.
When completed, the Truth Table should be the same as the one shown in *figure 6-2*.
The circuit has performed the operation OR.

Breadboard projects will appear from time to time with various lessons in this course. Kurz Kasch has suggested that operators and technicians interested in completing the breadboard projects could find the suitable hardware being offered by AP Products of Euclid, Ohio. AP Products, which markets through electronics hobby distributors and radio and television parts supply houses, offers an inexpensive breadboard. Components for the individual exercises can be gotten from Radio Shack outlets or from the operator's own inventory.

Next in the course series, which continues in PLAY METER, will be Diode-Transistor Gates (lesson seven) and Resistor-Transistor Gates (lesson eight).

Microcomputer terms reference

For those who are not familiar with the terms so often used in reference to microprocessor technology, here is a brief description of frequently occurring ones.

RAM is read/write memory which the microprocessor uses for temporary storage during the execution of a program, and to remember which images are where on the screen in video games. Unfortunately, as soon as the power is turned off, this type of memory device "forgets" all the information held in it.

Three main types of RAM are used: *dynamic ram*, which must be continually refreshed and is normally used for memory mapping video displays; *static ram*, which is more expensive but doesn't need to be refreshed and is normally used as "scratch pad;" and *CMOS ram*, which is even more expensive but needs very little current and is normally used with batteries so that it doesn't forget information when the machine is turned off—i.e., for storing the electronic bookkeeping information.

ROM is permanent memory which is used to store programs and video game characters. The information is put in by the semiconductor manufacturer and cannot be changed.

PROM is a device which has information put into it by the manufacturer and cannot then be changed. It is frequently used for program storage in early production machines; color information decoding in games including *Galaxians* and *Moon Crestas*; storing color information, as in color *Space Invaders*; and for producing timing signals and chip selects.

EPROM is a device which can have information put into it by the game manufacturers but can be later "wiped clean" and reprogrammed. Originally it was only used where fairly small quantities of a particular type of machine were to be manufactured, but it has become so cheap recently that it is being used to store programs and character information in many current machines. The most popular EPROMs are the 2708 which has a capacity of 1K (1,024 *bytes*) and the single rail 2716 which contains 2K (2,048 *bytes*). Several types of ROMs used by game manufacturers can be easily replaced by 2716 EPROMs.

—from Coin Slot Location

Novak

Osowski

New staffers at Midway Mfg.

Two appointments for the in-house team at Midway Manufacturing were announced by Stan Jarocki for the Franklin Park, Illinois games producer.

Kathryn Novak is a new member of the company's marketing team. Her duties, said Jarocki, will be to explore and expand existing and new markets for Midway coin-op games.

In her position,working with Marketing Vice President Jarocki, she will apply her education in marketing (at Arizona State University) to reviewing data on Midway games test markets, compiling and interpreting results, and writing reports.

Also at Midway, Brian Osowski has been appointed manager of its parts department. He has been with Midway since 1975 and comes with qualifications from its Material Control section.

Osowski's responsibilities will include control, maintenance, and dispatch of the numerous parts in a complete working inventory for the service of Midway games. V.P. Jarocki said the backup team will be "an efficient staff of computer terminal operators, packers, and a specialized system for the prompt shipment of Midway parts throughout the world.

Ms. Novak joined Midway in March, 1980 to work in customer service for the Electronic Components Division. She was previously employed by the McDonald Corporation in Oakbrook, Illinois, to prepare market and trading area analysis, gather research, work with computer data and interpret the results. •

Quotables:

CRT Chairman Clarence James on the CRT decision of raising the per-jukebox fees from $8 to $25 in 1982 and $50 in 1984: "I thought it should be $130 a box." Unquote.

Standard Change sales up

Standard Change-Makers,- Inc. officials in the company' 26th annual sales and service meeting at Indianapolis announced a expanded new line of floor console changers, the addition of models with capacities of holding up to $2,500 in change, and a new two-year warranty on all major Standard Change products.

John S. Dugan, Standard's national sales manager, said its line of floor console changers has been increased from two to seven models. The two new super-capacity changers are Series 8101 and 8001, which can hold $2,500 (10,000 quarters) in the one large hopper. They are designed for high volume locations—amusement centers, coin laundries, vending or transportation locations, etc., where there sis heavy demand for change or an operator's desire to fill equipment less frequently.

Dugan said the new Series 8503 (with three hoppers) replaces Standard's former Model 80, and Series 8602B (with magazine loading) replaces the older 6802B machine.

In announcing the two-year warranty on all major products, Dugan said: "For more than 25 years, although our official warranty was for only one year, in practice we have actually worked with our customers for longer periods of time whenever there was any legitimate problem with our products. We ahve always stood behind our products and our new two-year warranty is simply a reflection of that policy and the confidence we have in our products."

Dugan announced that despite the current economic slump, Standard Change-Makers' sales for 1980 continued to increase. Jack Ewald of Los Angeles and Jack McElwaine of Atlanta were cited as the company's number one and two district managers, respectively, in sales volume.

Panic 'timed' to fit locations

Universal U.S.A. has announced that it has made a hot game that was modified according to location demands.

Sales executive Hal Watner said, "After our initial sampling of *Space Panic,* we did a quite extensive research program. Initial reports were exciting but the most common complaint was that although it was the most played game, it gave the players too much time for their quarter. Reacting to player, operator, and distributor suggestive demands is a must in this industry.

"I am pleased to say that Universal heard, listened, reacted, and has modified *Space Panic*. After lengthy test period of the new *Space Panic*, earnings have better than doubled and now the only complaint is getting more *Space Panics* delivered at a faster rate," said Watner.

Shipments of *Space Panic* are being made daily by the factory in Santa Clara, California, he added.

PLAY METER CALENDAR

April 3-5
NAMA Western Convention, Phoenix Civic Center, Phoenix, Arizona

April 12-13
Milan Fair: park and amusement rides, and coin-operated games show, Milan, Italy

May 8-9
Ohio Music & Amusement Association, annual convention and trade show, Columbus Hilton Inn, Columbus

May 8-10
Music and Amusement Association/ New York annual convention, Kutsher's Country Club, Monticello

June 4-7
Music Operators of Texas, annual meeting, Houston

June 5-6
Wisconsin Music Merchants Association annual convention, Holiday Acres, Rhinelander

July 24-26
Amusement & Music Operators of Tennessee, annual convention, Hyatt Regency, Nashville

September 11-13
North Carolina and South Carolina coin operators associations' combined annual convention, Carolina Inn, Columbia

Getting the Bug

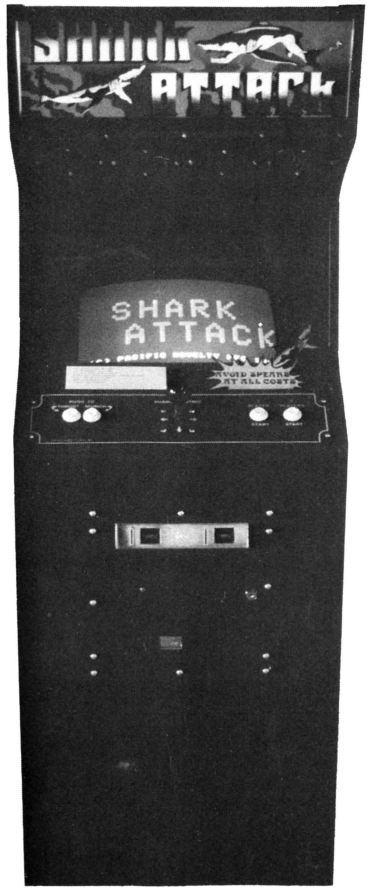
Game-A-Tron Corp. has debuted its space battle action video game *Space Bugger* in upright and cocktail models.

The game play, for one or two players, involves hiding behind barriers, keeping in motion by use of two movement control buttons, and firing with left and right fire buttons. Manipulating the gun turret, the player has to avoid "getting bugged" by the Space Bugger in order to keep in play.

Game-A-Tron product literature boasts "the industry's most advanced monitor, supported by high-reliability circuit board and futuristic cabinetry" for *Space Bugger*.

The upright cabinet is 25½" wide, 67" high, and 28" deep. The cocktail model stands 24½" high, 22" wide, and 34" in length.

Irv Jeffries, director of Game-A-Tron marketing and sales, said: "We're moving right along with our research and development, our sales, and our ideas. We're right on schedule in our progression and look forward to a fast-moving, successful new year."



Just when you thought it was safe ...

An unsuspecting team of divers explores the ocean depths. Suddenly a great shark appears, without warning, and the stage is set for an exciting fight to the finish in *Shark Attack*. The video game from Pacific Novelty Manufacturing, Inc. provides the player with an unusual perspective. The player is not the diver—the player is the deadly shark, with the mission of devouring all divers.

The player, using a joy stick "shark control," thrust button, and munch button, attacks each armed squadron of divers. Points are scored by eliminating individual divers, and bonus points are given for devouring an entire squadron. A bonus shark is given for seven squadrons devoured. But sharks hit by spears will die; all sharks eliminated ends the game.

This unusual concept, enhanced by brilliant color, realistic graphics, and a frightening quaraphonic sound track, makes *Shark Attack* an attention grabbing video game.

[See story on the new games manufacturer, Pacific Novelty, on page 2, this issue.]

classified advertising

VIDEO PINBALL CONVERSION KIT: Super Special $179.00. Includes logic board, harness assembly, all controlls, color field overlay, full instructions. BILL GROSSMAN & ASSOCIATES, Box 5421, Incline Village, NV 89450. (702)831-2990.

NEED BACKGLASS to Bally Vampire Pinball—need schematics for Williams Suspense pinball—need lens for Allied Leisure F-114. BIG DADDY'S AMUSEMENTS, 5701 Park Blvd., Pinellas Park, FL 33565. (813)546-6878.

WANTED TO BUY: Digger Machine—crane claw type. Send pictures, price, & specs to: T.J.'S, 14th Street Mall, Charlottesville, VA 22903.

PROVEN MARKETING PLAN can make you money in unique business. Improve health and income for you and your family. FREE details. Jim Sedlak, #7 Hillview Circle, Poughkeepsie, N.Y. 12603.

FOR SALE: 2 Royal 12' Cushion American Shuffleboards, complete with lights and electronic scoring, excellent condition. Bill Swanson, 110 Pearl St., Manistique, MICH 49854. (906) 341-2265 ..... $995.00 ea.

ASTEROID OPERATORS—tested & proven modification kit allows operators to adjust 3 different speed levels. IMMEDIATELY INCREASE PROFITS! $19.95 each plus $2.00 shipping. DESIGN WIZARDRY, P.O. Box 519, Brooklandville, MD 21022.

FOR SALE: 4 Million B.C. Pinball. **WANTED:** Backglass for 1945 Gottlieb 'Canteen'. Call (312)539-4644.

WANTED: Yoke for Midway's 'Clowns'—23" monitor. Contact: Mark Ewen, #10 Baldwin St., Norwich, NY 13815.

VIDEO GAMES FOR SALE: cocktail/coin-operated—Asteroids, Space Invaders, Pac-Man, Moon Cresta, and many more. Call for prices: N.J. (609)662-6622 or GA (404)636-4263. SKYLAND AMUSEMENTS.

SELL BY JULY 31: Modern, sizable route in Southeast. 37-year old operation with 2 offices (45 & 60 mile radius). 10 arcades with over 1000 pieces. 80% of route is 2 years old & younger. No rolling stock over 24 months old. Selling because of health reasons. N' more than 25% down but at least 20% down. Will finance balance myself at current bank rates. Please write for more info: c/o Pla' Meter Magazine, P.O. Box 24170, New Orleans, LA 70184. Dept. KAM.

FOR SALE: Pinballs, video games, foosball tables, I.E. Head-Ons, Space Invaders, Sprint II, Space Chaser, Break-Out, Future Spa, Roller Disco, Solar Ride, Dragons. Large Inventory. Call for prices. COIN AMUSEMENTS COMPANY (201)488-8488.

WANTED: FLOOR MAN for arcade in Tulsa area. Mr. Hogan, 11426 South 98th East Ave., Bixby, OK 74008. (918)369-2407.

FOR SALE: Aristocrat-Sega-Slot machines-mechanicals. Excellent condition. Also Space Invader cocktail tables, Galaxian cocktail tables, Bally Bingos, Sweet Shawnees, used jukeboxes for homes. UNITED STATES AMUSEMENTS, (201)926-0700 (Ask for Sal).

BLACKJACK FOR SALE: 16 Bar top model—$895.00. BRAY'S VENDING, 5412 92nd St., Lubbock, TX 79424. (806)794-5151.

NATIONAL ARCADE CHAIN SEEKING DISTRICT MANAGERS: Applicants must have arcade management experience and be able to troubleshoot, repair, and maintain electronic circuitry. Excellent starting salary and generous company benefits. This is a career opportunity. Send resume c/o Play Meter Magazine, P.O. Box 24170, New Orleans, LA 70184. Dept. UP01.

WANTED: back glass for a Gottlieb Super Circus pinball machine. Please call or Write: MIRACLES, 2014 Queen St. East, Toronto, CANADA 694-1954.

FOR SALE: Williams' Firepower (new) $1475; and Lazer Ball (wide like new) $1250; Bally Rolling Stones $1295; Midway Pac-Man (upright-perfect) $2595; Cinematronics Star Castle $2695; Atari Canyon Bomber (choice) $695. BIG RED COUNTRY BOYS, VENDISCO, INC., 411 E. 3rd, G.I. NE 68801

BIG QUANTITY NEW & USED GAMES FOR SALE: All types. Trades accepted. We ship anywhere. Call for list. Also: Boards serviced and parts for sale. DIXIE AMUSEMENT COMPANY, 2803 Pass Rd., Biloxi, MISS 39531. (601)374-2681.

FOOSBALL FIGURINES—BALANCED $39/per 100 or $290/per 1000. Send $1 for a post-paid sample pair. PLAYTRONICS INTERNATIONAL, INC., 3236 West Mescal St., Phoenix, AZ 85029

SEEBURG*SERVICE*—Black & Gray boxes $18.95 each. MCU Units $40.00. Fast Turn-around*SELECT SERVICE SYSTEMS 3547 West Beaver St., Jacksonville, FL 32205. (904)384-8585.

WANTED: backglass for Gottlieb 'Big Shot', Seeburg #222 power transformer #307150, Nutting Wimbleton Motorola H.O.T. #24D70148A14. WONDER NOVELTY, 5467 Highland Park Dr., St. Louis, MO (314)535-8473.

THE BEST USED VIDEO & PINBALLS: reconditioned or as is, clean, complete. WORLD WIDE DISTRIBUTORS, 36339 Groesbeck, Mt. Clemens, MI 48043. (313)791-7870. MICH (800)482-0614.

2nd Class
U.S. Postage Paid
Springfield, Mass. 01101
and additional mailing offices

PLAY METER
P.O. Box 24170
New Orleans, La. 70184